

## CORRESPONDENCE

It has been noted in some states of India, that rice cultivation has been reduced significantly for a variety of reasons. In case this correlates with a drop in the water-table, it may be coincidental or there may be a causal relationship. In the latter case, this would indicate that remedial measures may be

required to maintain the water-table at the required level. It would also suggest that a shift from rice cultivation to other crops might have ecological effects different from what would have been initially expected. This may be important for other crops, the flora and fauna of the region (including medicinal

plants) in addition to the wells themselves.

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## The digital opportunity index

The Digital Opportunity Index (DOI) is being developed by the International Telecommunication Union (ITU) and other partners in the 'Digital Opportunity Platform'. The second full release for 181 economies, was published in the 2007 edition of the World Information Society Report, available at <http://www.itu.int/wisr>. On behalf of the other members of the Platform, we are pleased to confirm that we welcome and encourage informed debate and constructive criticism of the DOI, which we still consider a work in progress. However, James<sup>1</sup> did not discuss his article with any member of the Platform prior to publication. Furthermore, James does not disclose that he received funding to participate in the Digital Opportunity Forum 2006, held in Seoul, the Republic of Korea from 31 August to 1 September 2006, where the methodology of the DOI was discussed.

James engages in extensive discussion of the equal weights assigned in the Index to the three clusters of opportunity, infrastructure and utilization. He claims that 'there is barely any discussion of the equal weights'. This is untrue. The Index was prepared following a prolonged series of open meetings in Busan (September 2004), Geneva (February 2005), Seoul (June 2005), Geneva (June 2006) and Seoul (August–September 2006). During these meetings, the issue of component weighting was discussed in detail and the Index results were subjected to sensitivity analysis. One of the forerunners of the DOI – ITU's Mobile/Internet Index (see <http://www.itu.int/mobileinternet>) – uses complex weightings calculated by factor analysis. Ultimately, for the DOI, a decision was taken to use equal weights (one-third each) for each component due to the lack of any objective or theoretical basis for alternative weights and a desire to keep the index as simple as possible,

so that it can be easily replicated and used as a policy tool by as broad an audience as possible.

James proposes a set of weights (one-sixth, two-thirds, three-sixths) that is erroneous, since his weights sum to greater than one (eight-sixths), which would distort the index. One can only attribute this to a typing error. Furthermore, he offers no theoretical justification for this particular set of weights, any more than the weights he seeks to criticize. I would suggest James' own illustration is proof of the need for simplicity in the weights.

James also criticizes the choice of the measure of 'percentage of population covered by mobile phone service'. He criticizes this because it is a measure of availability of service, rather than actual level of access, and because, in many developed countries, it is approaching 100%. Actual levels of access are measured by other indicators (the DOI includes this in its measure of cellular mobile subscribers per 100 inhabitants). It is important to include mobile coverage because this is a conceptual measure of the level of universal service (traditionally measured by availability, accessibility and affordability). Although it is close to 100% in many developed economies, it is considerably less in many developing economies and provides a useful differentiator of digital opportunity at lower levels of economic development.

James suggests instead to use either:

- Percentage of population covered by mobile signal that is actually able to use a phone (fixed or mobile); or
- The total number of mobile phones covered by mobile phone signal.

Data are insufficient and patchy for the first indicator. It would be difficult to find a comparable measure for 180 economies, except by using survey data which are generally not available and difficult

to update annually. For the second indicator, nearly all of mobile phones are likely to be covered by a mobile signal, as there is little value in purchasing a mobile phone unless it is usable most of the time. So, both James' suggestions for reformulating this measure of opportunity are impractical and less meaningful than mobile coverage. The DOI aims to cover as many economies as possible. The measures proposed by James would reduce the usefulness of the index, as well as introducing double-counting.

In summary, while James is correct in pointing out that the DOI is imperfect and that there is scope for improvement, his criticism is hardly constructive and he offers no real, practical advice. In our view, James should not offer criticism simply for the sake of it. The DOI represents a working compromise between what is desirable and what is possible, given the data limitations involved in measuring digital opportunity for 181 economies around the world. In this bold endeavour, we consider that the DOI succeeds quite well.

1. James, J., *Curr. Sci.*, 2007, **92**, 46–50.

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### Response

Kelly and Biggs apparently welcome criticism, except when it comes from someone who has been paid to attend a workshop devoted partly to the DOI. In

fact, I was paid to give a presentation not to suppress my criticisms of the DOI. To my amazement they overlook the two strenuous objections that I raised from the floor at the workshop. No ITU staff member at the time came forward to discuss my points of criticism.

Kelly and Biggs refute my claim that there is barely any criticism of the weights used in the DOI. They point to discussions in numerous parts of the world where this issue was apparently debated. This is entirely besides the point since I was referring solely to the documents available at the workshop. It is not part of my job to follow each and every occasion where the ITU hosts 'open meetings'.

It is a pity that the authors have to allude to a typo when they attempt to refute my suggestion of an alternative weighting system. It is also a pity that they seem not to think that my proposal has a theoretical foundation. The fact is that several

pages in my article are devoted specifically to this task. One can reasonably disagree with my reasoning, but to ignore it says much about the seriousness with which they have taken my article.

Kelly and Biggs then go on to defend the use of and the weight given to mobile coverage in the DOI. They refute my claim that the use of this measure has the effect of distorting the index in favour of the opportunity component and against the use indicator, which I believe is the culmination of the others and as such deserves a higher weight. I use the data in table 4 to show that the world average of the opportunity component is seven times larger than the use measure and that this has much to do with the inclusion of the undemanding, variable mobile coverage. The authors claim that the value of this variable is 'considerably less' in many developing countries than in developed. Yet, the largest developing country, China, has a mobile coverage of 80% and even

in some of the poorest developing countries, the figure is above this amount.

Throughout their comments, Kelly and Biggs fall back on the defence that the DOI is the most practical measure, able as it is, to cover 180 countries. The relevant question though is whether improvements to the index justify the costs entailed in gathering extra information. If the revised measures were to help policy-makers, the impracticality defence loses its force.

I would, finally, have welcomed a serious debate over the points that I raise in my article. But if even the basic argument I advance is glossed over or misunderstood, I see little prospect of that happening.

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## NEWS

### S. R. Srinivasa Varadhan receives Abel Prize

On 22 March 2007 the Norwegian Academy of Science and Letters announced S. R. Srinivasa Varadhan as the awardee of the Abel Prize for 2007.

What is the Abel Prize? The well-known mathematician Marius Sophus Lie had advocated the creation of the Abel Prize for mathematics around the time that plans for the Nobel Prize were made public, and did not include a prize for mathematics<sup>1</sup>. King Oscar II of Norway and Sweden was willing to finance a mathematics prize in Abel's name. Ludwig Sylow and Carl Stormer even did some groundwork to create this award, but this first effort collapsed following the dissolution of the Union between Sweden and Norway in 1905.

The Niels Henrik Abel Memorial Fund, to award the Abel Prize for outstanding scientific work in the field of mathematics, was eventually established on 1 January 2002, to commemorate the bicentenary of Abel's birth. In many ways the Abel

Prize is the counterpart of the Nobel Prize for mathematics (this is reflected also in the amount of prize money).



Varadhan is being awarded the Abel Prize in its fifth year for his fundamental contributions to probability theory and in particular for creating a unified theory of large deviation. The earlier Abel laureates are Jean-Pierre Serre (2003), Michael F. Atiyah and Isadore M. Singer (2004), Peter D. Lax (2005), and Lennart Carleson (2006).

Varadhan is the first mathematician of Asian origin to have won this prize. Born in Chennai (2 January 1940), Varadhan got his B Sc Honours degree in statistics from Presidency College, Chennai in 1959. He then went to Indian Statistical Institute (ISI), Kolkata, as a Ph D student.

At ISI, Varadhan was initially asked to work on statistical quality control. But probability theory interested him more, especially because some of his seniors from Chennai, such as V. S. Varadarajan, K. R. Parthasarathy and R. Ranga Rao, had formed a group to study probability theory and other related areas such as measure theory, topology, operators on Hilbert spaces and topological groups. Varadhan decided to join this group. The chief focus at ISI in those days was on statistics and statistical inference, and there were no professors to teach courses in probability. But the Institute encouraged its Ph D students to foray into areas of their choice. So Ph D students in this